REMARKS

The application has been reviewed in light of the Office Action dated May 19, 2006. Claims 1-9 were pending. By this Amendment, claims 2, 3, 5, 6, 8 and 9 having been canceled, without prejudice or disclaimer, new claims 10-12 have been added, and claims 1, 4 and 7 have been amended to clarify the claimed invention. Support for the claim amendments can be found in the application at, for example, page 33, lines 11-18, page 34, line 5 through page 35, line 5, page 41, lines 5-10, page 42, line 22 through page 43, line 1, page 44, lines 12-16 and in Fig. 12. Accordingly, claims 1, 4, 7 and 10-12 are now pending, with claims 1, 4 and 7 being in independent form.

Claims 1-9 were rejected under 35 U.S.C. § 103(a) as purportedly unpatentable over U.S. Patent No. 6,431,676 to Asauchi et al.

Applicant has carefully considered the Examiner's comments and the cited art, and respectfully submits that independent claims 1, 4 and 7 are patentable over the cited art, for at least the following reasons.

This application relates to head controllers and image recording apparatuses configured to adapt according to environmental temperature, in order to avoid image quality degradation due to environmental temperature changes.

For example, Applicant devised improvements for a head controller for controlling pressure creating means for contracting and expanding a volume of a pressurizing compartment communicating with a nozzle of a droplet discharging head. Such a head controller comprises drive waveform generating means for outputting a drive pulse that includes first through third waveform elements, wherein the first waveform element P1 expands the volume of the pressuring chamber, the second waveform element P2 maintains the expanded state of the volume of the

pressuring chamber, and the third waveform element P3 contracts the volume of the pressuring chamber. Additionally provided are means for decreasing a difference between a first potential difference (between the first waveform element at the beginning of expansion of the volume of the pressurizing comparument and the second waveform element) and a second potential difference (between the third waveform element at the end of contraction of the volume of the pressurizing compartment and the second waveform element) when environmental temperature is higher than a first predetermined temperature and increasing the difference between the first and second potential differences when the environmental temperature is lower than a second predetermined temperature.

In the above-mentioned head controller, varying the first waveform element P1, which is provided to expand the volume of the pressuring chamber, has a little influence on the size of droplets being discharged from the nozzle. Increasing the third waveform element P3 in the pulse amplitude, which is provided to contract the volume of the pressuring chamber, causes the volume "Mj" of droplets being discharged from the nozzle to be increased too much, which will make it difficult to form small-sized droplets discharged from the nozzle.

Accordingly, in one embodiment of this application (Figures 12 and 13), the drive waveform generating means is configured to generate and output a drive waveform having the first potential difference greater than the second potential difference (P1>P2), and configured to vary a potential of the first waveform element according to the environmental temperature without varying a potential of the third waveform element (only P1 is varied according to temperature changes). Each of independent claims 1, 4 and 7 addresses these features, as well as additional features.

Asauchi et al., as understood by Applicant, proposes an approach for generating driving

waveforms to actuate driving elements of a print head.

The Office Action cites Fig. 17A of Asauchi which shows a driving waveform wherein the Examiner has designated element 1 as the segment wherein the potential drops from Vc to Vo, element 2 as the segment wherein the potential remains at Vo, and the element 3 as the segment wherein the potential increases from Vo to Vh.

Fig. 17A of Asauchi does not show, however, that the first potential difference (between the first waveform element at the beginning of expansion of the volume of the pressurizing compartment and the second waveform element) is greater than the second potential difference (between the third waveform element at the end of contraction of the volume of the pressurizing compartment and the second waveform element), as provided by the subject matter of claim 1 as amended.

Further, it should be noted that Asauchi proposes (see Asauchi, figure 17B) that the first and the third waveform elements in the area "Te" of the temperature-corrected drive waveform COM2 are both varied. Increasing the third waveform element in the pulse amplitude, as proposed by Asauchi, may cause the volume of droplets being discharged from the nozzle to be increased too much. Thus, it is difficult for the device proposed by Asauchi to form small-sized droplets discharged from the nozzle. There is no teaching or suggestion in Asauchi that only the first waveform element is varied according to temperature changes, as provided by the subject matter of claim 1 as amended.

Applicant simply does not find disclosure or suggestion in the cited art of the subject matter of claim 1 as amended.

Independent claims 4 and 7 are patentably distinct from the cited art for at least similar reasons.

Accordingly, for at least the above-stated reasons, Applicant respectfully submits that independent claims 1, 4 and 7, and the claims depending therefrom, are patentable over the cited art.

In view of the amendments to the claims and remarks hereinabove, Applicant submits that the application is now in condition for allowance. Accordingly, Applicant earnestly solicits the allowance of the application.

If a petition for an extension of time is required to make this response timely, this paper should be considered to be such a petition. The Patent Office is hereby authorized to charge any fees that may be required in connection with this amendment and to credit any overpayment to our Deposit Account No. 03-3125.

If a telephone interview could advance the prosecution of this application, the Examiner is respectfully requested to call the undersigned attorney.

Respectfully submitted,

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